Sociality II: Agonistic Interactions

FISH 310

Today's Roadmap

1. Hierarchies
2. Defending Space:
   - Territories
   - Home Ranges

Astronotus ocellatus
Oscar
Cichlidae

Two types of **behavioral hierarchies**

1. **Linear hierarchies**: **alpha** animal dominates all others, a beta animal is subordinate to the alpha but dominates lower ranked individuals, etc., down to the last, or omega, individual
   - e.g. harems of the sex-changing Cleaner Wrasse, ***Labroides dimidiatus***

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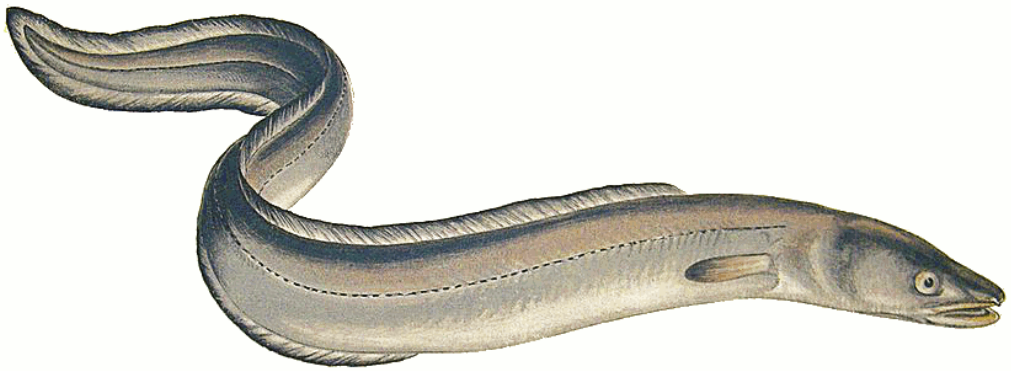
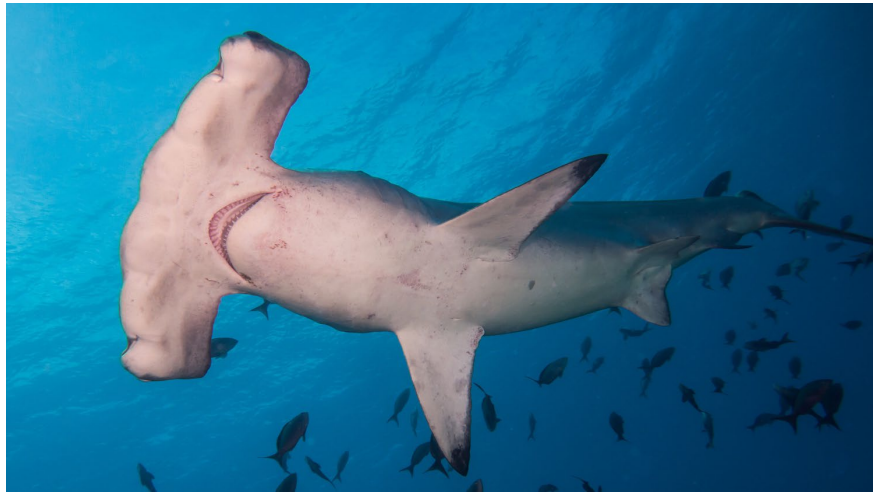
2. **Despotic hierarchies**: a single individual, the **despot**, is dominant over all other individuals, while subordinate animals have approximately equal ranks
   - e.g. **captive anguillid eels**: "1 large individual can monopolize 95% of a 300 L aquarium, relegating 25 other individuals to the remaining area where they mass together in continual contact" (Helfman et al.)



How is dominance maintained?

- **Size** & **age**: Larger (or older) dominant over smaller (or younger)
- **Sex**: Depends on species; sometimes females are dominant, sometimes males are dominant
- **Prior residency**: Residents dominant over intruders
- **Previous experience**: recently victorious fish tend to be aggressive and defeated fish submissive
- Dominant fish typically occupy best microhabitats, so they have higher feeding rates, leading to to faster growth, better condition, and higher fitness



Hammerhead Shark
Sphyrnidae

Ozark Cavefish
Amblyopsis

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Territoriality

- Defending a space (can be personal space or a resource)
- Variable over time:
  - From day to night, e.g. grunts
  - By age, e.g. Atlantic salmon

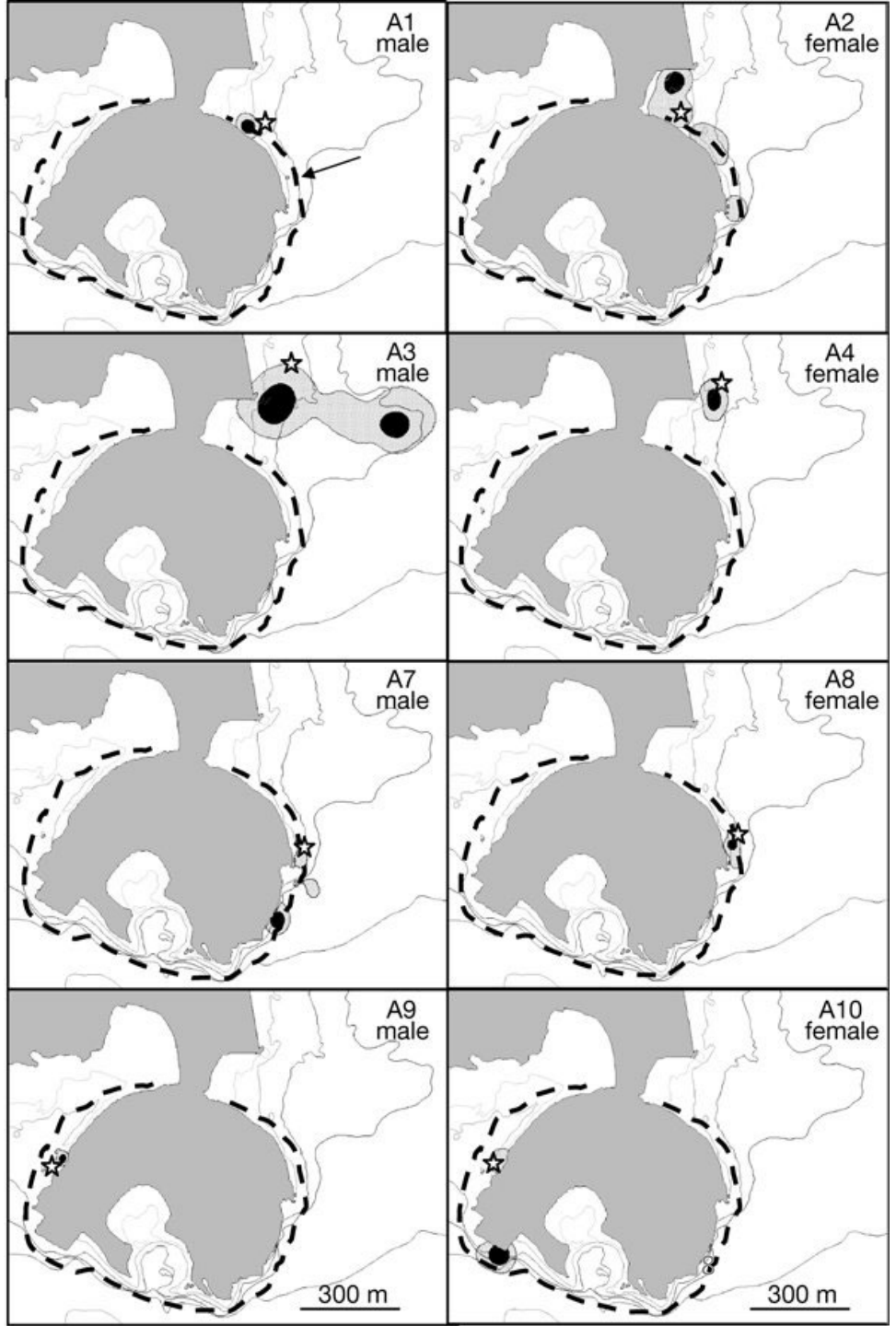
Juvenile *Diagramma pictum*
Silver sweetlips (Haemulidae)

Salmo salar
Atlantic Salmon (Salmonidae)

Home range = area a fish uses in its daily activities

- Can be very small (one tidepool) or very large (~ 1 km) or periodic residence in migratory species
- Range size might decrease with age/size in many species

Sparisoma cretense
Mediterranean Parrotfish



Afonso et al. 2008

Homing ability

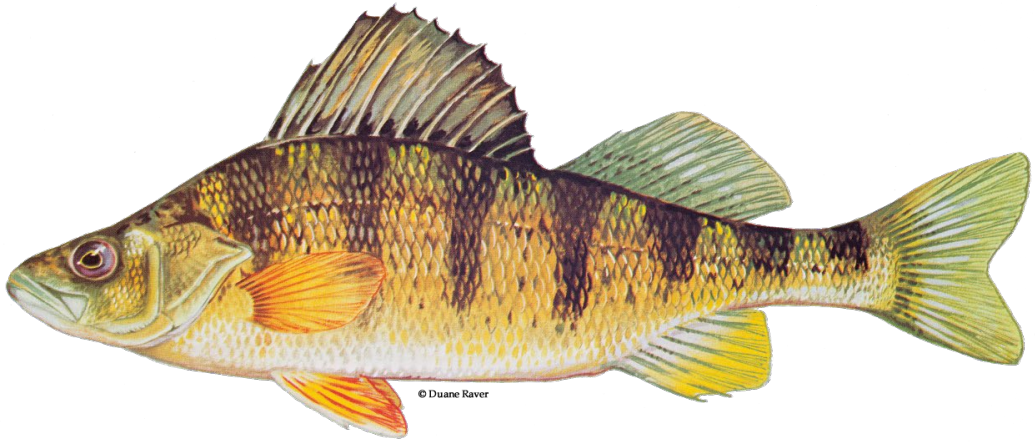
- Strong tendency to return to one's home site
- Some species identify landmarks to make "cognitive map" (Reese 1989)
- Older fish have stronger homing tendency than younger fish

Oligocottus maculosus
Tidepool Sculpin
Photo by Joel Sartore

What affects the use of a home range?

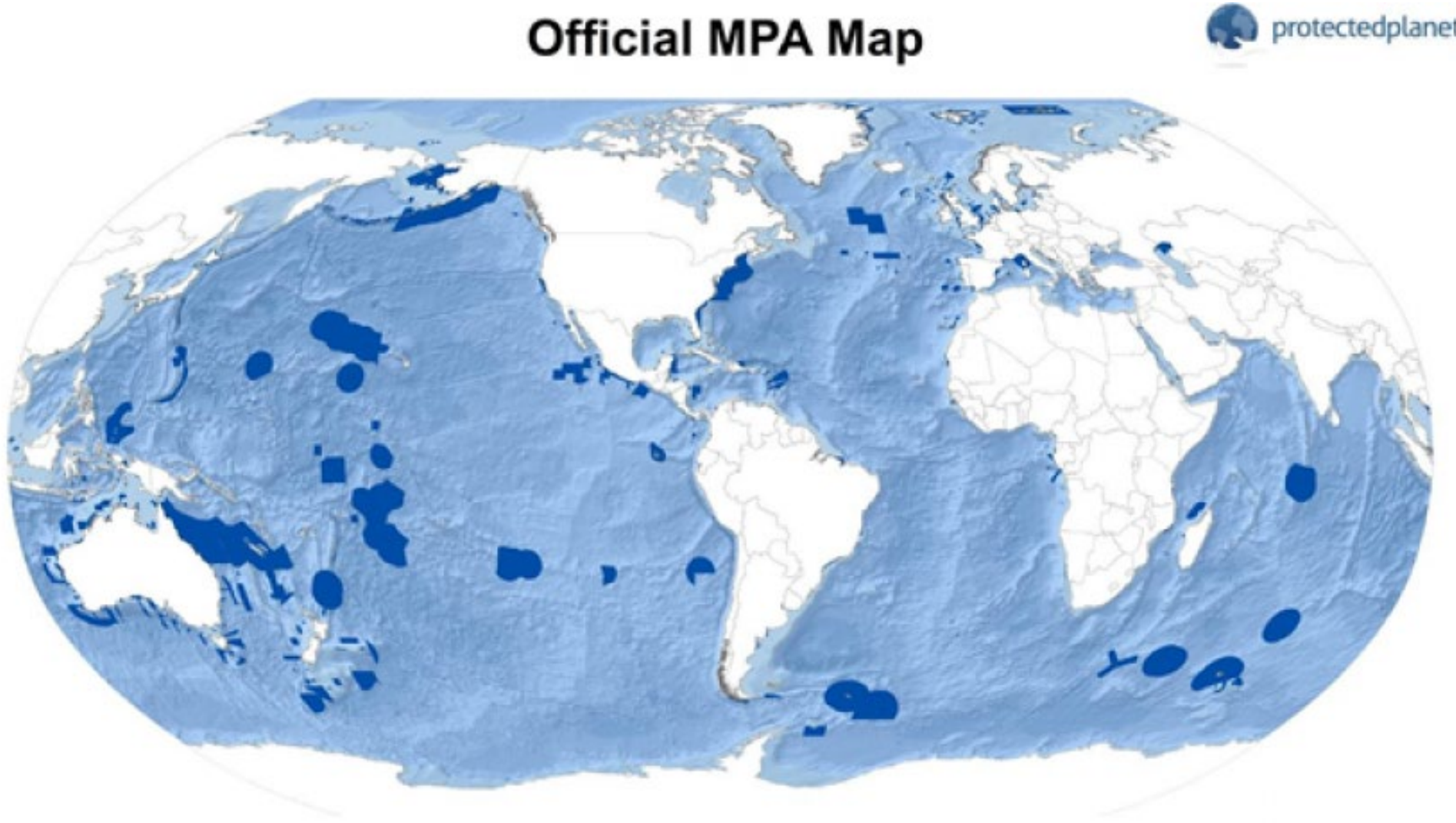
- Some home ranges deserted during breeding season
- Affected by shoaling (larger home ranges)
- Differs by individual

What might be the **selective advantage** conferred by having a home range?



Perca flavescens
Yellow Perch

Why are home ranges important for **conservation biology**?


Official MPA Map
protectedplanet
Source: UNEP-WCMC AND IUCN (2017). Protected Planet: The World Database on Protected Areas (WDPA) [On-line]. September, 2017, Cambridge, UK: UNEP-WCMC. Available at www.protectedplanet.net
UN environment
WCMC
6.35% of the Global Ocean covered by protected areas
1.89% exclusively no-take.
IUCN
WCPA